



DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2022-0978; Project Identifier AD-2022-00460-E; Amendment 39-22276; AD 2022-25-20]

RIN 2120-AA64

Airworthiness Directives; General Electric Company Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for certain General Electric Company (GE) GEnx-1B and GEnx-2B model turbofan engines. This AD was prompted by a manufacturer investigation that revealed that certain high-pressure turbine (HPT) stage 2 disks, forward seals, and stages 6-10 compressor rotor spools were manufactured from powder metal material suspected to contain iron inclusion. This AD requires replacement of the affected HPT stage 2 disks, forward seals, and stages 6-10 compressor rotor spools. The FAA is issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES:

AD Docket: You may examine the AD docket at [regulations.gov](https://www.regulations.gov) by searching for and locating Docket No. FAA-2022-0978; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, any comments received, and other information. The address for Docket Operations is U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: Alexei Marqueen, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7178; email: Alexei.T.Marqueen@faa.gov.

SUPPLEMENTARY INFORMATION:

Background

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to certain GEnx-1B64, GEnx-1B64/P1, GEnx-1B64/P2, GEnx-1B67, GEnx-1B67/P1, GEnx-1B67/P2, GEnx-1B70, GEnx-1B70/75/P1, GEnx-1B70/75/P2, GEnx-1B70/P1, GEnx-1B70/P2, GEnx-1B70C/P1, GEnx-1B70C/P2, GEnx-1B74/75/P1, GEnx-1B74/75/P2, GEnx-1B76/P2, GEnx-1B76A/P2 (GEnx-1B), GEnx-2B67, GEnx-2B67B, and GEnx-2B67/P (GEnx-2B) model turbofan engines. The NPRM published in the *Federal Register* on September 9, 2022 (87 FR 55328). The NPRM was prompted by a manufacturer investigation that revealed that certain HPT stage 2 disks, forward seals, and stages 6-10 compressor rotor spools were manufactured from powder metal material suspected to contain iron inclusion. Further investigation by the manufacturer determined that the iron inclusion is attributed to deficiencies in the manufacturing process. The investigation by the manufacturer also determined that certain GEnx-1B and GEnx-2B HPT stage 2 disks, forward seals, and stages 6-10 compressor rotor spools made from billets manufactured using the same process may have reduced material properties and a lower fatigue life capability due to iron inclusion, which may cause premature fracture and uncontained failure. In the NPRM, the FAA proposed to require replacement of certain HPT stage 2 disks, forward seals, and stages 6-10 compressor rotor spools with parts eligible for installation. The FAA is issuing this AD to address the unsafe condition on these products.

Discussion of Final Airworthiness Directive

Comments

The FAA received comments from four commenters. The commenters were Air Line Pilots Association, International (ALPA), American Airlines, GE Aviation, and The Boeing Company (Boeing). ALPA, American Airlines, and Boeing supported the

proposed AD without change. GE Aviation requested a change to the proposed AD. The following presents the comments received on the NPRM and the FAA's response to each comment.

Request to Add Alternate Part Numbers to AD Applicability

GE Aviation requested that the FAA add alternate part numbers (P/Ns) to Table 1 to paragraph (c) of this AD. GE Aviation explained that the forward seal and stages 6-10 compressor rotor spool may have reworked P/Ns that occur after entry into service. While the P/Ns provided in the NPRM are the best information available as to current P/Ns, GE requested that the FAA add certain alternate P/Ns to Table 1 to paragraph (c), Applicability, of this final rule to ensure compliance.

The FAA agrees for the reasons provided and has revised Table 1 to paragraph (c), Applicability, of this AD as requested by GE Aviation.

Conclusion

The FAA reviewed the relevant data, considered any comments received, and determined that air safety requires adopting this AD as proposed. Accordingly, the FAA is issuing this AD to address the unsafe condition on these products. Except for minor editorial changes, and any other changes described previously, this AD is adopted as proposed in the NPRM. None of the changes will increase the economic burden on any operator.

Related Service Information

The FAA reviewed GE GENx-1B Service Bulletin 72-0505, Revision 02, dated April 5, 2022. The FAA also reviewed GE GENx-2B Service Bulletin 72-0444, Revision 02, dated April 5, 2022. This service information describes procedures for removing the HPT stage 2 disk, forward seal, and stages 6-10 compressor rotor spool. These documents are distinct since they apply to different engine models.

Costs of Compliance

The FAA estimates that this AD affects 3 engines installed on airplanes of U.S. registry. The FAA estimates that 0 engines installed on airplanes of U.S. registry require replacement of the forward seal or HPT stage 2 disk.

The FAA estimates the following costs to comply with this AD:

Estimated costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
Replace stages 6-10 compressor rotor spool	8 work-hours x \$85 per hour = \$680	\$846,519 (pro-rated)	\$847,199	\$2,541,597
Replace forward seal	8 work-hours x \$85 per hour = \$680	\$364,558 (pro-rated)	\$365,238	\$0
Replace HPT stage 2 disk	8 work-hours x \$85 per hour = \$680	\$363,424 (pro-rated)	\$364,104	\$0

Authority for this Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

- (1) Is not a "significant regulatory action" under Executive Order 12866,
- (2) Will not affect intrastate aviation in Alaska, and

(3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

The Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39 - AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

2. The FAA amends § 39.13 by adding the following new airworthiness directive:

2022-25-20 General Electric Company: Amendment 39-22276; Docket No. FAA-2022-0978; Project Identifier AD-2022-00460-E.

(a) Effective Date

This airworthiness directive (AD) is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

(b) Affected ADs

None.

(c) Applicability

This AD applies to General Electric Company GEnx-1B64, GEnx-1B64/P1, GEnx-1B64/P2, GEnx-1B67, GEnx-1B67/P1, GEnx-1B67/P2, GEnx-1B70, GEnx-1B70/75/P1, GEnx-1B70/75/P2, GEnx-1B70/P1, GEnx-1B70/P2, GEnx-1B70C/P1, GEnx-1B70C/P2, GEnx-1B74/75/P1, GEnx-1B74/75/P2, GEnx-1B76/P2, GEnx-1B76A/P2, GEnx-2B67, GEnx-2B67B, and GEnx-2B67/P model turbofan engines with an installed high-pressure turbine (HPT) stage 2 disk, forward seal, or stages 6-10 compressor rotor spool with a part number (P/N) and serial number (S/N) identified in Table 1 to paragraph (c) of this AD.

Table 1 to Paragraph (c) – Affected HPT Stage 2 Disks, Forward Seals, and Stages 6-10 Compressor Rotor Spools

Part Name	P/N	S/N
HPT stage 2 disk	2300M84P02	TMT4AF08 TMT4AF10 TMT4AF11 TMT4AF12
Forward seal	2417M60P02 or 2759M04P01	VOLF1931 VOLF1933 VOLF1942 VOLF1977 VOLF1993 VOLF2014
Stages 6-10 compressor rotor spool	2357M30G02 or 2340M36G01	GWN0R86N
Stages 6-10 compressor rotor spool	2439M35G01 or 2610M90G01	GWN0RCKT GWN0R62G GWN0R86J GWN0R5EK GWN0R6EH GWN0R7K1 GWN0R89A
Stages 6-10 compressor rotor spool	2439M35G02	GWN0RA89 GWN0R6K9 GWN0R7G9 GWN0R7K4 GWN0R752 GWN0R98P

(d) Subject

Joint Aircraft System Component (JASC) Code 7230, Turbine Engine Compressor Section; 7250, Turbine Section.

(e) Unsafe Condition

This AD was prompted by a manufacturer investigation that revealed that certain HPT stage 2 disks, forward seals, and stages 6-10 compressor rotor spools were manufactured from powder metal material suspected to contain iron inclusion. The FAA is issuing this AD to prevent fracture and potential uncontained failure of certain HPT stage 2 disks, forward seals, and stages 6-10 compressor rotor spools. The unsafe condition, if not addressed, could result in uncontained debris release, damage to the engine, and damage to the aircraft.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Required Actions

(1) Before exceeding 600 flight cycles after the effective date of this AD, remove the affected HPT stage 2 disk, forward seal, and stages 6-10 compressor rotor spool from service and replace with a part eligible for installation.

(2) For affected engines not in service, before further flight, remove the affected HPT stage 2 disk, forward seal, and stages 6-10 compressor rotor spool and replace with a part eligible for installation.

(h) Definitions

(1) For the purpose of this AD, a “part eligible for installation” is any HPT stage 2 disk, forward seal, or stages 6-10 compressor rotor spool with a P/N and S/N not identified in Table 1 to paragraph (c) of this AD.

(2) For the purpose of this AD, “engines not in service” are engines that are in long-term or short-term storage as of the effective date of this AD.

(i) Installation Prohibition

After the effective date of this AD, do not install an HPT stage 2 disk, forward seal, or stages 6-10 compressor rotor spool with a P/N and S/N identified in Table 1 to paragraph (c) of this AD onto any engine.

(j) Alternative Methods of Compliance (AMOCs)

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in paragraph (k) of this AD and email to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

(k) Related Information

For more information about this AD, contact Alexei Marqueen, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7178; email: Alexei.T.Marqueen@faa.gov.

(l) Material Incorporated by Reference

None.

Issued on December 2, 2022.

Christina Underwood, Acting Director,
Compliance & Airworthiness Division,
Aircraft Certification Service.

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